

Document about T2CHK

Objective of the program: This program checks the relative permeability and capillary pressure curves set in the **ROCKS** or **PRCAP** blocks of **TOUGH2** input file, and calculate the equilibrium liquid saturation about capillary pressure in each material.

System requirement: Microsoft Windows 98, 2000 confirmed), it may run on Windows NT 4.0. It requires the minimum memory for OS.

Installation and start: The user can copy **t2chk1.exe** to any folder. And start by icon. If the user change the source program, it has to be re-compiled and linked with Compaq Visual Fortran 6.0 or later.

Input data format and limitation: **T2CHK** can read the **TOUGH2** input data with **ROCKS** and **RPCAP** blocks. It automatically picks up these blocks and calculates relative permeability and capillary pressure values. The number of material (including **RPCAP** block, if exists) is limited to 10.

Generated output files: Liquid phase relative permeability tables, gas phase relative permeability tables, capillary pressure tables are output to current directory. If you select the equilibrium calculation, equilibrium liquid saturation is also output to current directory. File names of each output file are fixed as follows.

Liquid phase relative permeability tables: **relliq.out**

Gas phase relative permeability tables: **relgas.out**

Capillary pressure tables: **capp.out**

Equilibrium liquid saturation data: **eqvpc.out**

Output file format: Relative permeability output files have the same formats.

	MATRX			FRACT			TOPBO
BOTBO							
Sliquid	Relp	Liquid	Sliquid	Relp	Liquid	Sliquid	
Relp	Liquid						
0.12000	0.0000000E+00		0.01000	0.0000000E+00	0.10000	0.0000000E+00	0.10000
0.0000000E+00							

First Line is material names. Second line is the name of data, from third to 103rd line, liquid saturation value and relative permeability value is written. Liquid saturation value is divided to 100 from residual to saturated saturation.

Capillary pressure output files has similar format.

	MATRX			FRACT			TOPBO
BOTBO							
Sliquid	Relp	Liquid	Sliquid	Relp	Liquid	Sliquid	
Relp	Liquid						
0.12000	0.0000000E+00		0.01000	0.0000000E+00	0.10000	0.0000000E+00	0.10000
0.0000000E+00							

From third line to last, liquid saturation and capillary pressure (Pa) is output.

Equilibrium saturation file is as follows,

Mat.#	Mat. Name	Sleqv	Pceqv
1	MATRX	0.8000000000E+00	0.2618498940E+06
2	FRACT	0.1025347412E-01	0.2618498954E+06

3	TOPBO	None.	None.
4	BOTBO	None.	None.

If it is impossible to calculate equilibrium condition, the character 'NONE.' is written.

Relative permeability and capillary pressure models: All kinds of relative permeability and capillary pressure models in **TOUGH2** can be handled.

Calculation of equilibrium saturation: The user can set reference material and reference liquid saturation value in reference material, such as the liquid saturation in matrix. This program calculates the liquid saturation value in other materials, which shows the same capillary pressure as reference material. In this program, Newton iteration is used to calculate equilibrium saturation. The cut-off value of saturation is set as 1.0×10^{-10} . If it is impossible to calculate equilibrium saturation (0 capillary pressure in dummy etc.), the calculation is skipped.

Figures: Relative permeability graph for liquid and gas phase is drawn in color graph. Capillary pressure graph is also drawn. The user can select normal-log plot about capillary pressure graph.

User interface: Each operation by user is selected with pull-down menu. The input file name is selected with dialog. The user can change both current drive and current directory. The reference material number and reference liquid saturation is input by dialog.

Pull down menus:

- File**
 - Read Input File** (Define TOUGH2 input file name, read data and construct relative permeability and capillary pressure tables)
 - List Output** (Output table data, and equilibrium saturation data)
 - Exit** (Exit from program)
- Draw**
 - Relative Permeability** (Draw relative permeability curves)
 - Capillary Pressure (Normal)** (Draw capillary pressure curve in normal-normal scale)
 - Capillary Pressure (Log)** (Draw capillary pressure curve in normal-log scale)
- Calc**
 - Equil. Pc** (Input reference material and reference liquid saturation and calculate equilibrium liquid saturation in other materials)

Developed environment: Compaq visual Fortran 6.0, Fortran 90 with QuickWin

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